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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

Enhanced Preliminary Assessment Report:

Slatersville Army Housing Units North Smithfield, Rhode Island

October 1989

prepared for

Commander
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

prepared by

Environmental Research Division
Argonne National Laboratory
Argonne, Illinois 60439

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Argonne National Laboratory has conducted an enhanced preliminary assessment of the Army housing property located in North Smithfield, R . The objectives of this assessment include identifying and characterizing all onmentally significant operations, identifying areas of environmental contamination that may require immediate remedial actions, identifying other actions which may be necessary to resolve all identified environmental problems, and identifying other environmental concerns that may present impediments to the expeditious sale of this property.

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SUMMARY

The Slatersville housing area presents no imminent or substantial threat to human health or the environment. Although this property was originally developed as part of a Nike missile battery located in Slatersville, R.I., no wastes associated with the operation and maintenance of the missile-launch and tracking systems have been delivered to or managed at the housing area. The sewage system at the housing area was totally independent of the Nike battery's two operational areas. Drinking water has been supplied to the housing area by an on-site Army-owned well. (Water supplied to the former missile-launch and fire-control areas of the Nike battery was provided by a separate Army-owned well.)

Review of past and current practices at the Slatersville housing area indicates that there has been some adverse impact on the environment. For many years, improper maintenance of a formerly used septic-tank sewage system, coupled with the system's proximity to the water table, constituted a potential health hazard to the occupants and a source of groundwater contamination. However, the pollutants were mainly biodegradable organic materials, and no release of hazardous pollutants is documented.

Soil contamination from heating-fuel storage tanks may also be a problem. There reportedly have been spills from two above-ground tanks. The area's 14 underground tanks are not known to have leaked, but they are approximately 30 years old and therefore near the end of their expected useful life. The ground around the fill pipes of the underground tanks at the housing area generally manifest heavy oil stains. The drinking-water distribution system was contaminated by groundwater infiltration in 1987, and the water storage tank had to be drained, decontaminated, and chlorinated. The use of an asbestos-cement main in the distribution system is a source of some concern also. To date most of the problems have been rectified. A new septic system was installed in 1989. However, several deficiencies in the area have a potential future impact on the property and need to be addressed.

Three actions are recommended prior to release of this property.

- Inspect the two above-ground heating-fuel storage tanks and sample soils adjacent to their locations to ensure tank integrity and the absence of soil contamination. If corrosion or deterioration is found, the corroded tank should be replaced and disposed of in an accepted manner.

- Replace the 14 aging underground tanks. Tank excavations should be sampled and analyzed for petroleum contamination and any contaminated soils removed and disposed of in an acceptable manner.

- Disconnect and replace the asbestos-cement main from the water-distribution system.

1 INTRODUCTION

In October 1988, Congress passed the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526. This legislation provided the framework for making decisions about military base closures and realignments. The overall objective of the legislation is to close and realign bases so as to maximize savings without impairing the Army's overall military mission. In December 1988, the Defense Secretary's ad hoc Commission on Base Realignment and Closure issued its final report nominating candidate installations. The Commission's recommendations, subsequently approved by Congress, affect 111 Army installations, of which 81 are to be closed. Among the affected installations are 53 military housing areas, including the Slatersville housing area (North Smithfield, R.I.) addressed in this preliminary assessment.[1]

Legislative directives require that all base closures and realignments be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA). As a result, NEPA documentation is being prepared for all properties scheduled to be closed or realigned. The newly formed Base Closure Division of the U.S. Army Toxic and Hazardous Materials Agency is responsible for supervising the preliminary assessment effort for all affected properties. These USATHAMA assessments will subsequently be incorporated into the NEPA documentation being prepared for the properties.

This document is a report of the enhanced preliminary assessment (PA) conducted by Argonne National Laboratory (ANL) at the Army stand-alone housing area in North Smithfield, R.I.

1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program by assessing the environmental quality of the installations proposed for closure or realignment. Preliminary assessments are being conducted under the authority of the Defense Department's Installation Restoration Program (IRP); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 91-510, also known as Superfund; the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499; and the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, Public Law 100-526.

In conducting preliminary assessments, ANL has followed the methodologies and procedures outlined in Phase I of the IRP. Consequently, this PA addresses all documented or suspected incidents of actual or potential release of hazardous or toxic constituents to the environment.

In addition, this PA is "enhanced" to cover topics not normally addressed in a Phase I preliminary assessment. Specifically, this assessment considers and evaluates the following topical areas and issues:

- Status with respect to regulatory compliance,
- Asbestos,
- Polychlorinated biphenyls (PCBs),
- Radon hazards (to be assessed and reported on independently),
- Underground storage tanks,
- Current or potential restraints on facility utilization,
- Environmental issues requiring resolution,
- Health-risk perspectives associated with continued residential land use, and
- Other environmental concerns that might present impediments to the expeditious "excessing," or transfer and/or release, of federally owned property.

1.2 OBJECTIVES

This enhanced PA is based on existing information from Army housing records of initial property acquisition, initial construction, and major renovations and remodeling performed by local contractors or by the Army Corps of Engineers. The PA effort does not include the generation of new data. The objectives of the PA include:

- Identifying and characterizing all environmentally significant operations (ESOs),
- Identifying property areas or ESOs that may require a site investigation,
- Identifying ESOs or areas of environmental contamination that may require immediate remedial action,
- Identifying other actions that may be necessary to address and resolve all identified environmental problems, and
- Identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

1.3 PROCEDURES

The PA began with a review of Army housing records located at Fort Devens, Mass., approximately 35 miles northwest of Boston the week of May 15-19, 1989. Additional information was obtained from the Army Corps of Engineers District Office in Waltham, Mass., on May 17 and from conversations with personnel from the office of the Area Engineer, Fort Devens, on May 18. A site visit was conducted at the Slatersville housing area on May 18, 1989, at which time additional information was obtained through personal observations of ANL investigators. Photographs were taken of the housing units and surrounding properties as a means of documenting the condition of the housing units and immediate land uses. Site photographs are appended.

All available information was evaluated with respect to actual or potential releases to air, soil, and surface and ground waters.

Attempts to gain access to the housing units through involvement of the senior occupant were unsuccessful. Therefore, internal inspection of the units was not possible during the site visit. However, ANL investigators revisited the property on September 9, 1989, at which time the interiors of all of the units were inspected.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION[2,3]

The Slatersville housing area is located in North Smithfield County, R.I., close to the border of Massachusetts. It consists of 3.82 acres of fee-owned land and 16 single-family units with attached garages. It was originally constructed for use by personnel assigned to Nike missile battery PR-99. After the Nike site was turned over to the National Guard in 1963, the housing units have been occupied by Navy as well as by regular Army and Army National Guard personnel.

Figures 1 and 2 show the general location of the facility.

2.2 DESCRIPTION OF FACILITY

Figure 3 presents the site plan of the housing area.

Housing Units[2,3]

The housing area consists of 16 single-family, three-bedroom units with attached garages; a septic-tank sewage system; and a water-distribution system. The buildings were constructed in 1958 on concrete slabs, with wood-frame exterior walls and asphalt shingle roofs. The utility room in each unit is equipped with an electric hot water heater and an oil-fired hot air heater. In the back yards are in-ground trash bins, each approximately three quarts in capacity, that are reportedly no longer being used.

Utilities

Electricity is supplied by a public utility. Solid waste (garbage) is collected and disposed of off-site by the town of Slatersville.

Sewage System[4-8]

Prior to installation of a new sanitary sewage system at the Slatersville housing area in 1989, 14 of the 16 houses had individual systems consisting of underground septic tanks, seepage pits, and distribution boxes. The 14 septic tanks each had a 750-gallon capacity. The remaining two houses shared an 1,100-gallon-capacity septic tank. All 15 septic tanks shared a common leach field behind the housing units. Because of the layout of the housing and the varying topography of the area, each house has its own sewage-design problems. However, all former disposal systems contributed visible solids to the leaching facilities. Over the course of years, these solids choked off the leaching characteristics of the surrounding soils. A lack of proper maintenance pumping of the septic tanks and the proximity of trees planted near the septic systems probably

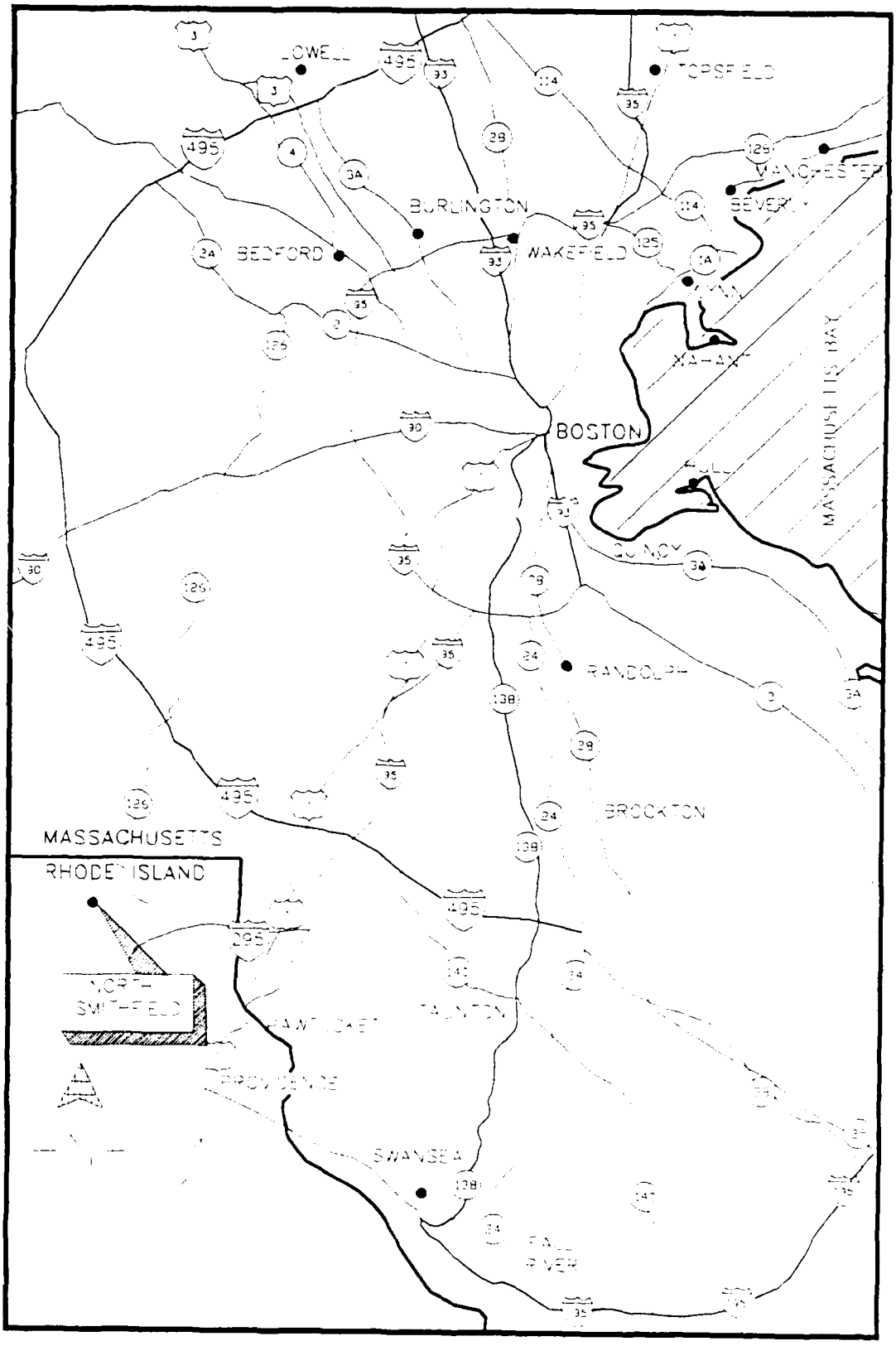

FIGURE 1 Location Map of Army Housing Facilities in the Areas of Boston and Providence

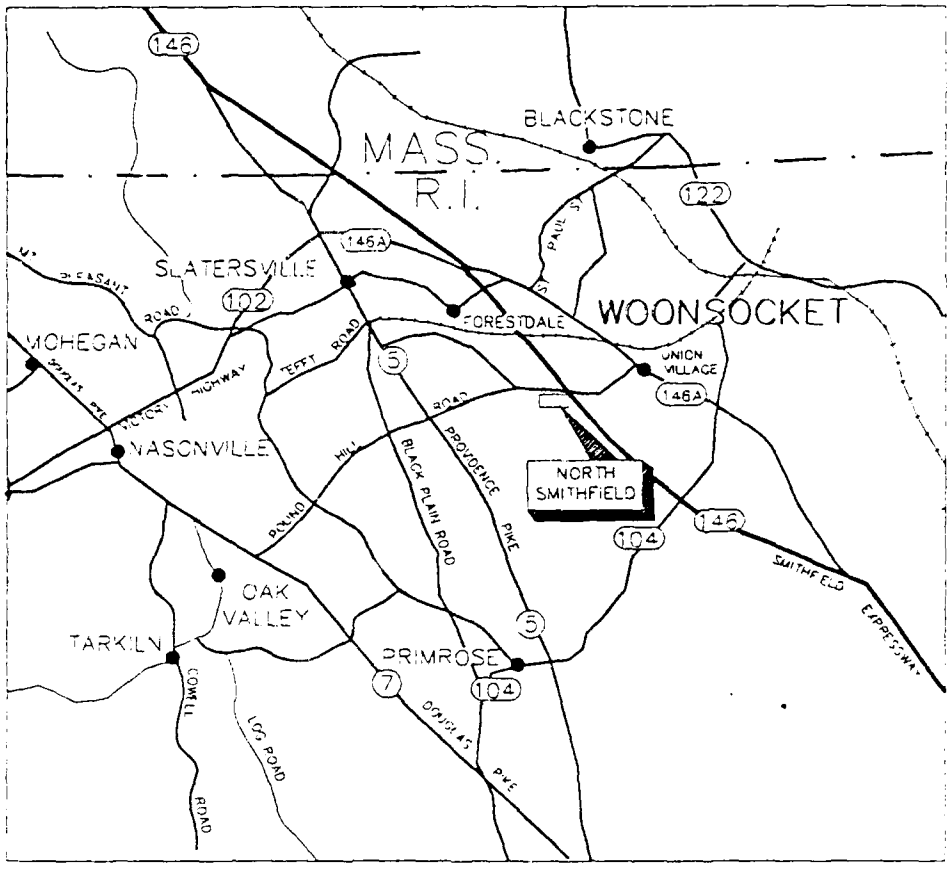

FIGURE 2 Vicinity Map of Slatersville Housing Area

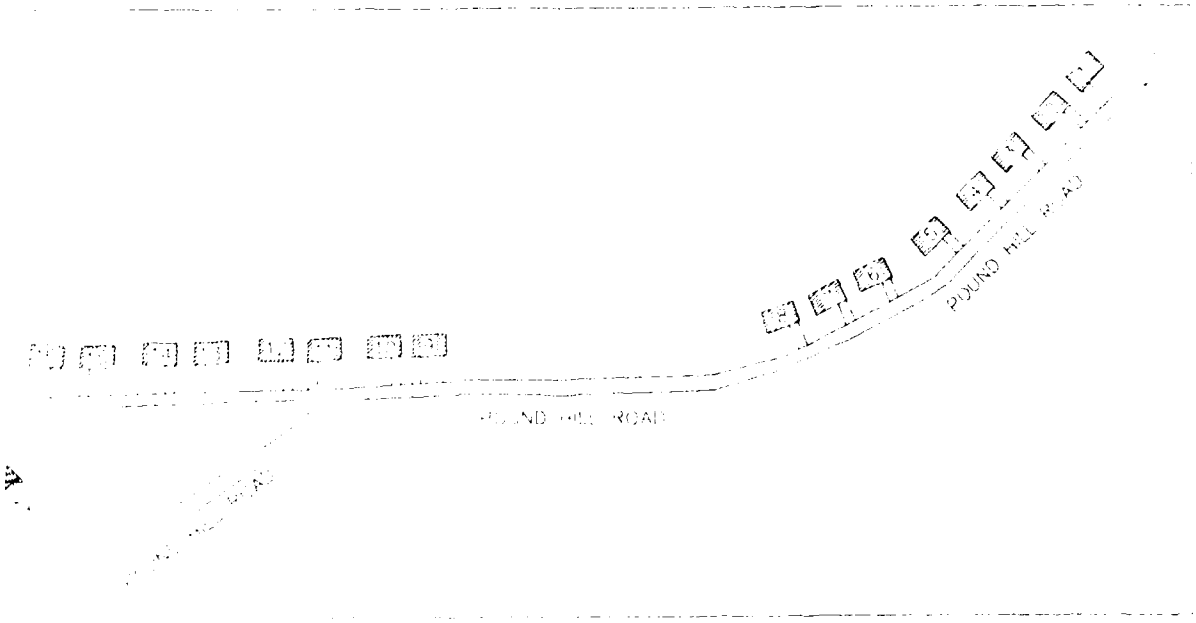

FIGURE 3 Site Plan Map of Slatersville Housing Units

contributed to the malfunctions. In addition, the bottom of the former leaching facilities at the housing units located in the lower area (#9 through #16) appeared to be constructed close to the water table, allowing groundwater to infiltrate back into the system. Grading in the area of those units is not conducive to good surface water runoff, which probably compounded the problem.

The cost for pumping the septic tanks had been steadily increasing because sanitary contractors have had a difficult time disposing of the waste materials. After investigative studies by the New England Division of the Army Corps of Engineers in 1988 and a topographic survey, deep-hole observations and percolation tests were carried out, and a new septic system was installed at the Slatersville housing area in 1989.

Water-Distribution System[8-10]

Water for the housing units is supplied by the Rhode Island Army National Guard (ARNG) armory located adjacent to the east border of the housing area. A well installed between 1956 and 1959[8] is located on this ARNG property. The Army, however, maintains the pump house and the water-storage tank. Distribution lines are run from the ARNG site to the housing units, which are downgradient from the Guard property. A 4-inch asbestos-cement main is used in the water-distribution system. Chlorination and soda-ash ion exchange were at one time performed on water as it was recovered from the well, but these practices have been discontinued. No information was located as to why these procedures were discontinued. In 1987, the water-storage tank had to be drained, cleaned, decontaminated, and chlorinated; the well foundation also had to be raised above the grade to prevent further surface water infiltration.

At present, well water is regularly sampled by Fort Devens personnel. A design for the remodeling of the pump house has been approved. Construction of the new pump house is expected to be completed by 1990.

Fuel-Storage Tanks[8]

Fuel oil (#2) is used for heating the Slatersville housing units. Each house has an individual storage tank. There are underground storage tanks in front of 14 of the houses and above-ground tanks under the car ports of two houses. The tanks were installed in 1958 and were constructed of steel with asphalt coating. To the best knowledge of those interviewed, none of the 16 tanks (believed to have been installed during initial construction) has been replaced. There is no apparent explanation as to why two of these tanks are above-ground.

Storm Drainage

The storm drainage system for the housing area is of the common type of open ground ditches and surface runoff.

Other Permanent Structures or Property Improvements

A new septic system was installed in 1989, replacing the original individual sewage-treatment facilities at the 16 houses.

2.3 PROPERTY HISTORY

2.3.1 Nike Defense Program and Typical Battery-Level Practices

Generic information on the national Nike antiaircraft defense program has been compiled in two studies, one commissioned by the Army Corps of Engineers[11] and the other by the U.S. Army Toxic and Hazardous Materials Agency.[12] In both studies, independent contractors relied on information contained in unclassified documents related to the Nike surface-to-air missile program, including engineering drawings and specifications (for the facilities and the missiles themselves), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operations and maintenance of Nike facilities. Taken together, these two reports represent the most complete assemblage of generic information on the Nike missile program from an environmental perspective. Salient points from both reports are condensed below.

At its zenith in the early 1960s, the Nike program included 291 batteries located throughout the continental United States. The program was completely phased out by 1976, with many of the properties sold to private concerns or excessed to state or local governments for nominal fees.

Nike Ajax missiles were first deployed in 1954 at installations throughout the continental United States, replacing, or in some cases augmenting, conventional artillery batteries and providing protection from aerial attack for strategic resources and population centers. Typically, Nike batteries were located in rural areas encircling the protected area. The Ajax was a two-stage missile using a solid-fuel booster rocket and a liquid-fuel sustainer motor to deliver a warhead to airborne targets.

The Ajax missile was gradually replaced by the Nike Hercules missile, introduced in 1958. Like the Ajax, the Hercules was a two-stage missile, but it differed from the Ajax in that its second stage was a solid-fuel rather than liquid-fuel power source and its payload often was a nuclear rather than conventional warhead. Ajax-to-Hercules conversions occurred between 1958 and 1961 and required little change in existing Nike battery facilities. A third-generation missile, the Zeus, was phased out during development and consequently was never deployed.

A typical Nike missile battery consisted of two distinct and separate operating units, the launch operations and the integrated fire control (IFC) operations. The two operating areas were separated by distances of less than two miles, with lines of sight between them for communications purposes. A third separate area was also sometimes part of the battery. This area was typically equidistant from the two battery operating sites and contained housing for married personnel assigned to the battery. Occasionally,

these housing areas also contained battalion headquarters, which were responsible for a number of Nike batteries.

Depending on area characteristics and convenience, the housing areas were often reliant on the launch or IFC sites for utilities such as potable water, electrical power, and sewage treatment. In those instances, buried utility lines connected the housing area to one or both of the other battery properties. It is also possible, however, that housing areas were completely independent of the missile launcher and tracking operations. In those instances, the necessary utilities were either maintained on the housing site or purchased from the local community. In many localities, as the character of the land area around the housing units changed from rural to suburban or urban, communities extended utility services to the housing unit locations, in which case conversions from independent systems to community systems were made.

A large variety of wastes was associated with the operation and maintenance of Nike missile batteries. Normally encountered wastes included benzene, carbon tetrachloride, chromium and lead (contained in paints and protective coatings), petroleum hydrocarbons, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene. Because of the rural locations of these batteries, and also because very few regulatory controls existed at that time, most of these wastes were managed "on-site." (Unused rocket propellants and explosives, however, would always have been returned to central supply depots and not disposed of on-site.) It is further conceivable that wastes generated at one of the Nike properties may have been transferred to its companion property for management or disposal.

Wastes related to missile operation and maintenance would not have been purposely transferred from a battery operating area to a housing area with no facilities for waste management or disposal. In some instances, however, the sewage treatment facilities for all Nike battery properties were located at the housing area; that possibility cannot be automatically ignored. Finally, where housing areas received various utilities from either of the operating areas, it is also possible that wastes disposed of on those other properties may have migrated to the housing area via the buried utility lines. And since decommissioning of the Nike batteries did not normally involve removal of buried utility or communication lines, any such contaminant migration is likely to have gone unnoticed.

2.3.2 Slatersville Housing Units

The units were constructed in the late 1950s for Army personnel assigned to the Slatersville Nike missile battery and their dependents. Use of the property was turned over to the ARNG in 1963, and the housing units since then have been used by Navy as well as Rhode Island ARNG personnel. The Army has retained ownership, however, throughout the property's history.

A new septic system was installed in 1989, rectifying the sanitary sewage problems that had plagued the housing area in previous years. An aged pump house on an adjacent land parcel owned by the ARNG is in the process of being renovated and upgraded, with construction expected to be completed in 1990. It is not known whether

the asbestos-cement main in the water-distribution system will be replaced as part of this renovation. Although asbestos is primarily known to be hazardous to health through inhalation, inadvertent ingestion of this substance should also be avoided.

Inspections of the interiors of the units on September 9 revealed that there was no insulation whatsoever in water pipes of any of the units.

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

The Slatersville housing area, near the Rhode Island-Massachusetts state line, is surrounded by pastures and woods. An Army National Guard (ARNG) armory is immediately east of the housing area. No adverse environmental impaccts have been identified for this armory.

The principal sources of groundwater contaminants in the area are waste-disposal sites, underground fuel-storage tanks, surface impoundments of liquid wastes, solid-waste landfills, septic systems and cesspools, storage areas for highway deicing salt, and oil and chemical spills.

2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

North Smithfield County is located in the Blackstone River Basin of the New England Upland section of the New England Physiographic Province. The Blackstone River originates in the upland areas of south-central Massachusetts, flows southeastward to Rhode Island, and discharges into a tidal estuary at the head of Narragansett Bay. Upstream from tidewater, the river drains an area of 478 square miles, 22% of which is in Rhode Island. The drainage area in Rhode Island includes 50 ponds, lakes, and reservoirs, and 116 miles of streams. The larger tributary to the Blackstone River is the Branch River, which drains much of northwestern Rhode Island. It enters the Blackstone River near the Massachusetts-Rhode Island state line. Topographic relief in the area is moderate.[13]

The Blackstone and the Branch rivers are contaminated by municipal and industrial wastewaters. Organic compounds are the principal contaminants; they cause local deficiencies in dissolved oxygen during low flow and elevated coliform-bacteria counts during both high and low flows. Expansion and upgrading of sewage-collection and treatment facilities, and elimination of several industrial-waste discharges during the past two decades, have considerably improved the quality of water in these rivers. Nevertheless, several reaches of the Branch River and all of the Blackstone River were unsuitable for water-contact activities in 1984 because of bacterial contamination. The inorganic-chemical content of the water in both rivers is comparatively low, making the quality of the water suitable without treatment for many uses other than drinking. Concentrations of dissolved solids in the Branch and the Blackstone rivers generally are less than 100 milligrams per liter (mg/L) and 200 mg/L, respectively.

The largest flood on the Blackstone River since at least 1645 occurred during a hurricane in August 1955. Intense rains and failure of a dam in Massachusetts resulted in

a maximum discharge of 32,900 cubic feet per second (21,300 x 10^6 gal/day) at the U.S. Geological Survey stream gage at Woonsocket; this flow is 1.7 times greater than the 100-year flood flow at this station. Construction of a flood-control reservoir upstream in Massachusetts and other smaller-scale flood-control structures in Rhode Island, following the 1955 flood, have reduced the potential for flood damage. However, several residences and commercial and industrial structures in the floodplain remain susceptible to damage by flooding.

The average annual precipitation in the area is about 48 inches. The mean annual lake evaporation is 27 inches. The average annual runoff is 22 inches. The 1-year, 24-hour rainfall is about 3 inches.

Groundwater is present in two types of aquifers -- unconsolidated Pleistocene glacial deposits and consolidated Paleozoic bedrock. The glacial deposits, which overlie and largely conceal bedrock, are divided into stratified drift and till. Stratified drift consists of interbedded lenses of stratified and sorted gravel, sand, and silt. Till consists of a poorly sorted mixture of boulders, gravel, sand, silt, and some clay. Stratified drift constitutes the principal aquifer. Till and bedrock constitute minor but important aquifers that provide small supplies to homes.

Stratified drift mantles the bedrock surface in about one-third of the state, chiefly in valleys. These deposits are commonly 75 to 125 feet thick. The thickest and most transmissive parts of the stratified-drift aquifers can yield as much as 700 gallons per minute (gal/min) to wells. Dissolved-solids concentrations in groundwater generally were less than 100 mg/L, which is significantly smaller than the drinking-water standard of 500 mg/L. In the Providence area, where stratified drift overlies and is partly derived from sedimentary rocks, a few analyses of water from wells indicated that dissolved-solids concentrations in groundwater may be larger there than in most other areas of Rhode Island.

Glacial till covers bedrock in about two-thirds of the state, chiefly in the upland areas. Average thickness of the till is about 20 feet. Till aquifers once were tapped by many large-diameter dug wells that provided small, commonly unreliable yields to much of the state's population. Many older homes still obtain water from the till aquifers. However, because wells in till may become dry during droughts, and because these wells are more susceptible to contamination from individual sewage-disposal systems, most such wells have been abandoned in favor of deeper wells drilled into bedrock.[14]

Bedrock aquifers store and transmit water through a network of narrow, widely spaced fractures. Significantly indurated to largely metamorphosed sedimentary rocks (conglomerate, sandstone, shale, and some coal) of Pennsylvania age underlie Narragansett Bay and adjacent land areas. Crystalline igneous and metamorphic rocks, mostly of granitic composition, underlie the southeasternmost part of the state and most of the area west of Narragansett Bay. These bedrock units generally yield less than 20 gal/min to wells usually 100 to 300 feet deep. Most of the 9% of the state's population not served by public-supply systems obtain their water from wells that penetrate bedrock aquifers.

In 1985, 24% of Rhode Island's nearly 1 million people obtained their drinking supplies from groundwater. Most of this water was pumped from public-supply wells completed in principal stratified-drift aquifers. The quality of groundwater in most parts of the state is suitable for human consumption and other uses with little or no treatment. Typically, groundwater has dissolved-solids concentrations smaller than 200 mg/L and is soft (hardness less than 60 mg/L as calcium carbonate), slightly acidic (pH 5.5 to 7.0), and cold (10 to 12° Celsius). However, Rhode Island's groundwater is very vulnerable to contamination because it occurs nearly everywhere under unconfined conditions and because the water table commonly is less than 20 feet beneath the land surface. Locally, the quality of groundwater has been moderately to severely degraded.[15]

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

Environmentally significant operations at the Slatersville housing area include (1) an original septic-tank sewage system, replaced in 1989; (2) underground and above-ground fuel-storage tanks; and (3) an asbestos-cement main in the water-distribution system.

3.1 FORMER SEPTIC-TANK SEWAGE SYSTEM

The original sanitary sewage system at the Slatersville housing area was revamped in 1989 to rectify earlier problems.

Although documentation[5] shows that a sanitary contractor was engaged to pump the former septic tanks at the housing unit in 1986 and 1987, it is not clear whether such maintenance work was carried out earlier or whether it is a recent endeavor. Because everything in the systems failed because of the inability of seepage pits or, at units #9 and #10, leaching fields to function,[6] it appears that the old sewage system was never properly maintained. Also contributing to the malfunctioning of septic systems at units #9 and #16 was the fact that surface drainage was directed to a swale that ran directly over the leaching field and seepage pits for these units. At houses #1 through #8, raw sewage flowed freely out of the top of leaching pits and down the banking. Children were known to have used the area for playing, so the sewage problem constituted a serious health hazard in the years prior to 1989.

3.2 FUEL-STORAGE TANKS

The area's 14 underground and two above-ground storage tanks are constructed of steel with asphalt coating. All 16 tanks are reportedly the original ones installed in the late 1950s.

Each tank services a single housing unit. The fill pipes for the 14 underground storage tanks are located in the front yards of the houses. Although there is no documented release of fuel to the soil from the underground tanks, spillage around the filler pipes was evident at several of the units. There had been reported fuel-oil spills from the two above-ground tanks located in the car ports of two of the units. It was not clear if the spills resulted from tank defects, accidents, or overfilling. No soil contamination from the spills was documented. The personnel interviewed had no knowledge of the extent of any of the spills nor of any subsequent cleanup that may have been carried out. No deleterious effects were observed during the property visit.

3.3 ASBESTOS-CEMENT MAIN

The water-distribution system at the Slatersville housing area has an asbestos-containing cement main. It was installed in the 1950s (probably during original construction), before asbestos was found to be a health hazard. The condition of this pipe is unknown.

4 KNOWN AND SUSPECTED RELEASES

There have been releases of contaminants to groundwater from the old septic system at the Slatersville housing area. The bottoms of the former leaching facilities were constructed close to the water table, which resulted in pollution of the uppermost groundwater aquifer. However, the well located on the adjacent ARNG property draws groundwater from a deeper aquifer, which was not affected by the malfunctioning septic systems.

In 1987, the water storage tank at the adjacent ARNG armory had to be decontaminated and the well foundation raised to prevent further infiltration of surface water into the well. It is presumed that these actions became necessary to address high bacteria concentrations resulting from infiltration of surface water at the wellhead. No written document or analytical results on this could be located.

There have been no documented releases of contaminants to soil from this property. However, the ANL site-investigation team observed evidence of staining of the ground around the fill pipe of one of the underground storage tanks. Several other houses exhibited similar contamination of the soil near oil-tank filter pipes. There are reported past spills from both of the above-ground tanks in the carports. It was not clear whether the spills extended to areas outside of the concrete paved carports; and if so, whether proper cleanup and disposal of the contaminated soil had been carried out. No ground staining was observed in areas adjacent to the car port pavements.

Malfunctioning of the former septic system left visible solids in the leaching facilities. These contaminants were biodegradable human wastes, which posed immediate health hazards. Such wastes do not have long-term impacts, however, and harmful long-term effects on the soil are not suspected.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

The Slatersville housing area was originally developed in the late 1950s as part of a Nike missile battery located in Slatersville, R.I. No wastes associated with the operation and maintenance of the missile-launch and tracking system are known to have been delivered to or managed at the housing property. The old sewage system at the housing units consisted of individual septic tanks and a common leachfield. The system was totally independent of Nike operating areas. Although water is supplied to the housing area from a well located at the former fire-control area of the Nike battery, no contaminants have been found in this well.

The proximity of the former septic system (replaced in 1989) to the water table, coupled with improper maintenance of the facilities, had resulted in groundwater infiltration of the septic tank and raw sewage backups. Such situations created serious health hazards to occupants of the housing area. The problem was rectified with the installation of a new septic system in 1989.

Two above-ground fuel-storage tanks and 14 underground fuel-storage tanks on the property are reportedly the original tanks, installed in the late 1950s, and are near the end of their useful life expectancies. The high water table in this area is conducive to tank corrosion. Although there is no documented release to the soil from the fuel-storage tanks, some localized soil contamination was observed at the filler pipes of several of the underground tanks. The above-ground tanks in the garages were also reported to have leaked, but the personnel interviewed were not sure whether the soil near the garages was contaminated, or if subsequent cleanup had been carried out.

6 RECOMMENDATIONS

The Slatersville housing area does not constitute an imminent or substantial threat to human health or the environment. However, based on available documentation and interviews with personnel knowledgeable about the housing facility, four actions are recommended.

- Inspect the two above-ground heating-fuel storage tanks and sample soils adjacent to their locations to ensure tank integrity and the absence of soil contamination. If corrosion or deterioration is found, the corroded tank should be replaced and disposed of in an accepted manner.

- Replace the 14 aging underground tanks. Tank excavations should be sampled and analyzed for petroleum contamination and any contaminated soils removed and disposed of in an acceptable manner.

- Disconnect and replace the asbestos-cement main from the water-distribution system.

These recommendations assume that the property will most likely continue to be used for residential housing.

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5. Facilities Engineering Work Request, Subject: "Prepare a service contract to pump the septic tanks in the North Smithfield, R.I., Family Housing Area" (1987).

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9. Transfer of Construction, PR-99, North Smithfield, R.I. (April 1, 1958).

10. Purchase Request and Commitment, to Purchasing and Contracting Officer, from Family Housing, Subject: "Request the water storage tanks in North Smithfield, R.I., be drained, cleaned, decontaminated, and chlorinated" (Oct. 20, 1987).

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12. U.S. Army Toxic and Hazardous Materials Agency, *Historical Overview of the Nike Missile System*, prepared by B.N. McMaster et al., Environmental Science and Engineering, Inc., for USATHAMA Assessments Div., Aberdeen Proving Ground, Md. (Dec. 1984).

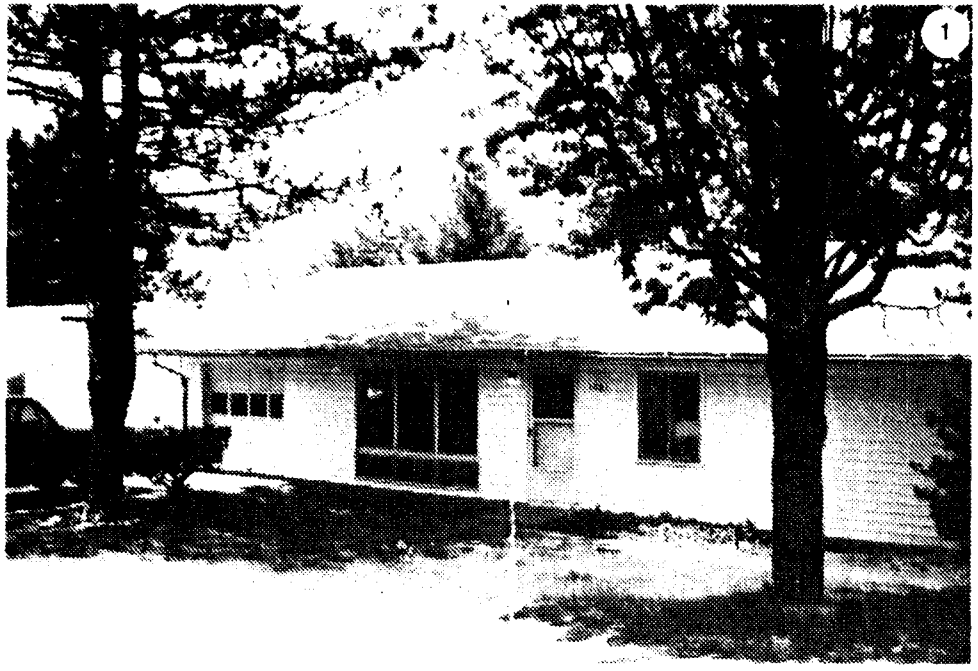
13. U.S. Geological Survey, *National Water Summary, 1985 Hydrologic Events and Surface-Water Resources*, Water Supply Paper 2300 (1986).

14. Sagwinsin, J.L.S., et al., *The Northeast Regional Environmental Impact Study: Description of the Existing Northeast Regional Geohydrology*, U.S. Department of Energy Report DOE/RG-0059 (1981).

15. U.S. Geological Survey, *National Water Summary, 1986, Hydrologic Events and Ground-Water Resources*, Water Supply Paper 2325 (1987).

APPENDIX:

PHOTOGRAPHS OF SLATERSVILLE HOUSING FACILITY AND SURROUNDING LAND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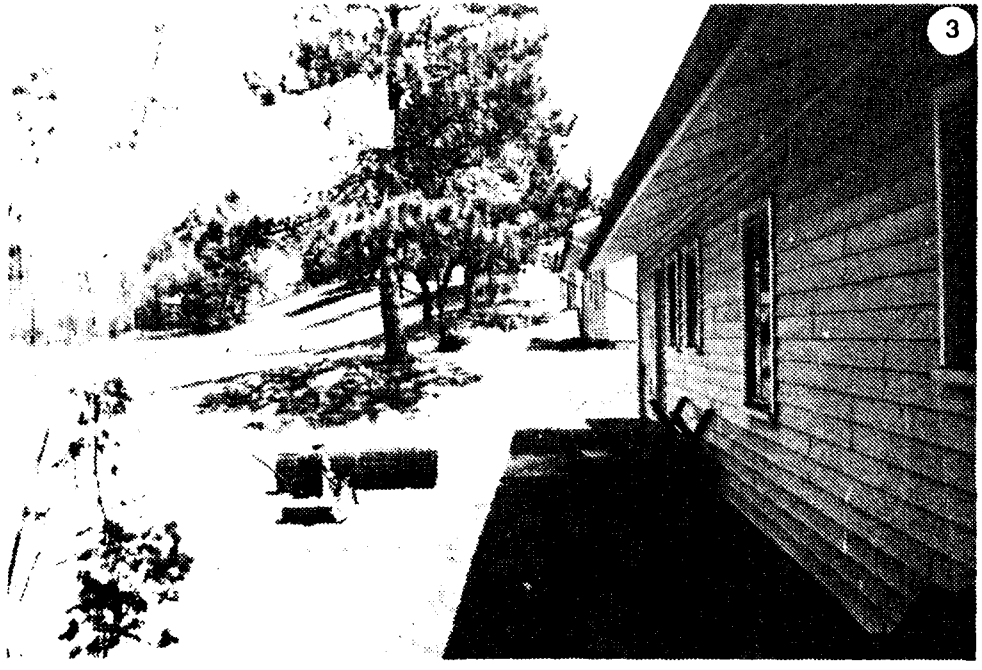
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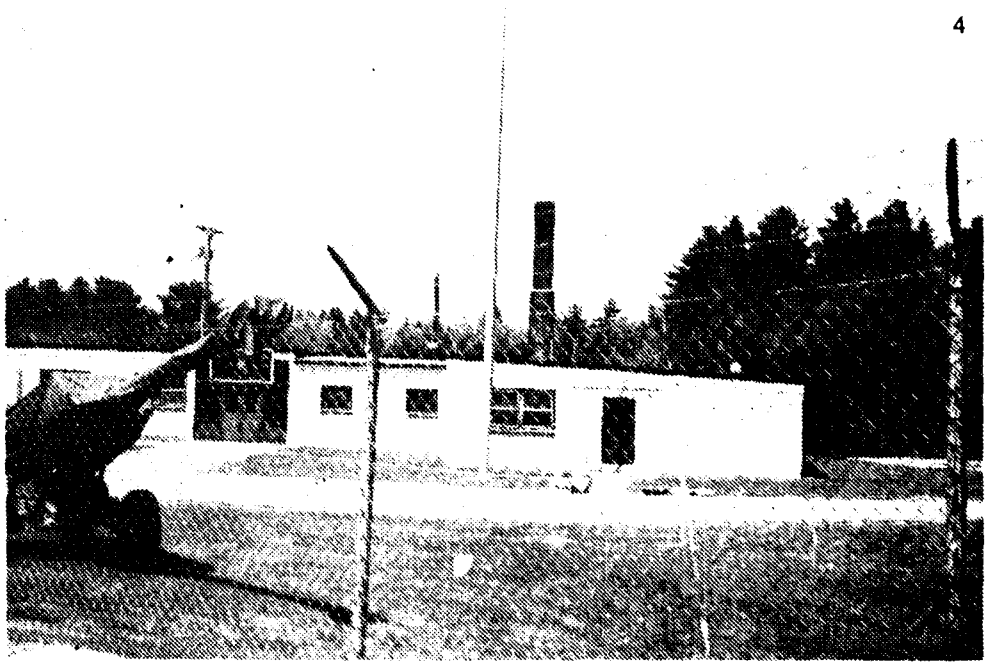
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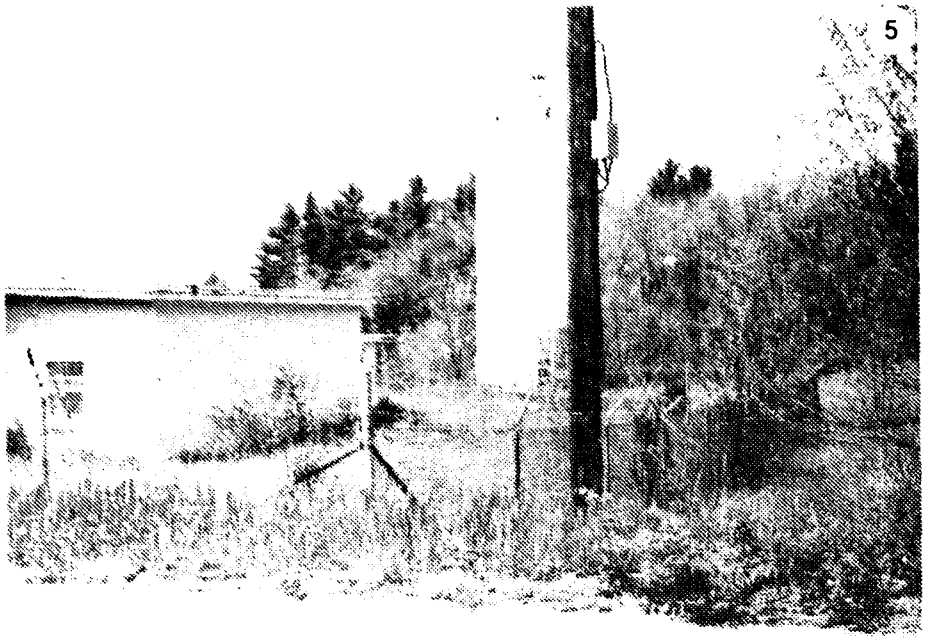

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IDENTIFICATIONS OF PHOTOGRAPHS

1. Three-bedroom housing unit with attached garage.

2. Wooded area behind a housing unit.

3. Improvement work (construction of a concrete patio) in progress outside a housing unit.

4. Army National Guard base near the housing facility.

5. Pump house and water-storage tank operated by the Army National Guard, located up the road from the housing facility.

6. Fill pipe for an underground storage tank, located in the front yard of a housing unit; note oil stains and contaminated soil surrounding the rising pipe.

7. In-ground trash bin, no longer in use at the facility.